

## CIVIL AERONAUTICS BOARD

**ACCIDENT INVESTIGATION REPORT**

Adopted: September 23, 1952

Released: September 26, 1952

PAN AMERICAN WORLD AIRWAYS, INC. - SAN JUAN, PUERTO RICO,  
APRIL 11, 1952

The Accident

A Pan American World Airways' aircraft, a Douglas DC-4, N 88899, was ditched at approximately 1220,<sup>1/</sup> April 11, 1952, about eleven miles northwest of San Juan, Puerto Rico, after taking off from the Isle Grande Airport. On board were five crew members and 64 passengers, including six infants. Fifty-two passengers lost their lives as a result of this ditching, and the aircraft sank in water approximately 2,000 feet deep and could not be recovered.

History of the Flight

Pan American World Airways' Flight 526A originated at San Juan and departed there at 1211, April 11, 1952, for New York, New York. The crew consisted of Captain J. C. Burn, First Officer W. T. Hutchins, Second Officer J. R. Laubach, Purser A. Perez, and Steward R. Torres. According to company records, the aircraft at the time of takeoff weighed 31,868 kilograms (70,256 pounds), which was within the allowable gross takeoff weight of 33,113 kilograms (73,000 pounds). The load was properly distributed with respect to the approved center of gravity limits of the aircraft.

Prior to departure, the captain filed with Air Route Traffic Control an IFR (Instrument Flight Rules) flight plan to New York International Airport, New York, to cruise at an altitude of 8,000 feet, estimating the flight time as eight hours and three minutes. This flight plan was approved.

The crew testified that the aircraft was taxied to the end of Runway No. 9, the pre-takeoff check made, and the takeoff run started. During the takeoff and the initial climb, the aircraft appeared to be sluggish but not to an extent to cause concern. At an altitude of approximately 250 feet with the gear up, the flaps were raised and power was reduced to climb power. Climbing at an indicated air speed of 155 miles per hour, the first officer noticed that the oil pressure of No. 3 engine was falling and the oil temperature increasing. This condition was immediately pointed out to the captain, who requested that the San Juan tower be advised that they were returning to the airport. Accordingly, at 1213 the flight advised the tower of its intentions, and the tower replied, "Roger 526A, cleared to land, Runway 9, wind

<sup>1/</sup> All times referred to herein are Atlantic Standard and based on the 24-hour clock.

east one eight, altimeter two nine nine five. I'll notify your company." The company was notified and upon request, emergency field equipment was alerted.

Because the oil pressure of No. 3 engine continued to drop rapidly and the oil temperature correspondingly increased, the propeller of this engine was feathered and power was increased to rated power on the remaining three engines. By this time the aircraft's altitude was approximately 350 feet. When power was increased, the No. 4 engine backfired several times; however, immediately following these backfires, the engine continued to run in a normal manner. A climbing turn was initiated to a westerly heading, and the captain said that for best climbing conditions he reduced the aircraft's air speed during the turn to 145 miles per hour. This reduction in air speed was accomplished by using up elevator. Upon reaching an altitude of about 550 feet, No. 4 engine again backfired and ran rough. Manifold pressure was reduced on this engine to approximately 32-35 inches, and again the engine ran smoothly. Subsequent attempts to operate No. 4 engine at increased power were unsuccessful due to recurrent roughness.

At 1217 the tower asked the flight to report its position and received this reply: "We are still quite a way out." And at 1218, the tower advised the U. S. Coast Guard Rescue Coordination Center at San Juan that the flight was in trouble and gave its position as seven miles, 300 degrees from the tower.

The captain gradually reduced the air speed to 135 miles per hour, and at this time the heading of the aircraft was changed slightly to the right to maintain a course approximately parallel to the coast line. Because the aircraft was losing altitude, engines No. 1 and No. 2 were increased to takeoff power. The second officer was sent to the passenger compartment to advise the purser and steward that fuel was to be dumped, and all fuel dump valves were then opened. After the second officer returned to the cockpit, the flight advised the tower, at 1219, that it might have to ditch, and the captain instructed the second officer to alert the passengers. The second officer returned to the cabin, indicated that a ditching was imminent, took a forward seat in the cabin and fastened his safety belt.

At 1220, an Air Force C-47 flying in the vicinity notified the San Juan tower that a DC-4 seemed to be ditching and accordingly was advised to circle the area. Flight 526A continued to settle, and the throttles of engines Nos. 1 and 2 were advanced to their stops. With the air speed near 120 miles per hour, the flaps were lowered to five degrees. Shortly after this, a landing on the water was made. The landing gear and flaps were lowered, and the fuel dump valves closed. The second officer obtained a life raft, which he carried to the main cabin and launched through a forward emergency exit on the right side. The first officer, after an unsuccessful attempt to loosen another life raft, abandoned the aircraft through a cockpit window. The captain entered the cabin and assisted passengers in evacuating the aircraft through the main cabin door until he was swept overboard by the action of the sea against the door. The aircraft sank approximately three minutes after landing on the water.

At the time of the accident the weather was: high broken clouds at 35,000 feet with lower scattered clouds at 3,000 feet, visibility 20 miles and wind from east-southeast, 16 miles per hour.

### Investigation

From a large oil slick which was observed on the water following the sinking of the aircraft, it was determined that the ditching occurred at latitude 18° 32.6' north and longitude 66° 15.5' west. This is approximately four and one-half miles off the north coast of Puerto Rico and eleven miles from the airport.

Captain Burn said that when the "pre-takeoff" check was accomplished all engines operated normally but that during the takeoff the aircraft was a little slow in accelerating. However, the engine instruments indicated that they were delivering normal power with all pressure, temperature, and fuel flow gauges indicating a normal operation.

According to the captain's testimony, from the time No. 3 propeller was feathered until landing on the water, he was either attempting to establish a climb or was flying the aircraft in a nose-high attitude in an effort to maintain altitude, and air speed and altitude were diminishing throughout the entire period. He stated that because the aircraft was continuing to lose altitude, he changed his original heading, which was toward the airport, to avoid a possible forced landing in a congested area or on a coral reef.

He stated that no appreciable yawing of the aircraft was noticed when the No. 3 propeller was feathered, and that after a minor trim correction he experienced no difficulty in maintaining directional control. Throughout the latter portion of the flight, the first officer had the check list in hand, and both he and the captain checked all the instruments and controls in the cockpit seeking an answer to the aircraft's continuing loss of air speed and altitude. This check also showed all controls positioned properly and engine instruments indicating normal operation for the conditions involved. The captain said, however, that immediately prior to ditching, the fuel flow of the Nos. 1 and 2 engines appeared to be low. Approximately two minutes after the fuel dump valves were opened, the landing was made. The crew said the landing was made tail low and was not considered sufficiently rough to damage the aircraft; however, prior to leaving his seat, the first officer looked out of his window and saw the aircraft's tail section floating in the water. It was later found that the tail section had broken off behind a bulkhead to the rear of the cabin door. Although heavy seas were running at the time of the accident, none of the seats were torn from their fastenings.

Three twenty-man rafts and one ten-man raft were carried on board the aircraft as a part of the life-saving gear. These were stowed in an open rack to the rear of the pilots' compartment. In addition to the life rafts, a pneumatic life jacket was available for each passenger. These jackets were located in a pocket on the back of each seat. Above each pocket was a sign, in both Spanish and English, describing the location of the jackets.

According to the testimony of the purser and steward, they were seated in the rear of the aircraft when the second officer returned to the main cabin the second time and by a downward motion of his hands indicated the aircraft was about to be ditched. Although they did not hear this crew member say anything, they understood that ditching was imminent, made certain their seat belts were fastened, and donned their life preservers. After the aircraft contacted the water, they shouted to the passengers that the life jackets were located in the backs of the seats and then proceeded forward, opened the two emergency exits on the left side of the cabin, climbed out on the wing and assisted passengers through these exits. The passengers were not told where the jackets were located or instructed in their use by any crew member prior to ditching. As a result, considerable confusion occurred.

The second officer was able to loosen a twenty-man raft from its moorings in the pilot's compartment and carry it to the main cabin where he launched it through a forward emergency exit on the right side of the aircraft, through which he also departed. The first officer and a woman passenger tried to loosen additional rafts, but were unsuccessful, and because of the rapidly rising water were forced to abandon ship, both departing through the right cockpit window.

Immediately following the ditching the captain went into the cabin and ordered the passengers to abandon ship; however, there was very little response. He then aided a passenger to open the main cabin door, and began forcibly evacuating passengers through that exit. While so engaged, the door slammed closed, and the captain gripped the handle in an effort to open it again, but as he did so a wave caught the door violently pushing it outward, throwing him into the water. Due to the heavy seas, he was unable to return to the aircraft.

Of the 12 passengers who survived, seven evacuated the aircraft through emergency cabin exits, four through the main cabin door, and one through the right cockpit window. The first and second officers boarded the only life raft launched, and took aboard five surviving passengers, the purser and the steward. The captain and seven other passengers were picked up by rescue aircraft after floating in the water from thirty minutes to an hour.

When the U. S. Coast Guard Rescue Coordination Center was advised that the aircraft might ditch, they immediately prepared for action. A Coast Guard PBY amphibious aircraft was alerted to prepare for rescue operation, and a few minutes later was dispatched to the scene. The U. S. Coast Guard cutter "Bramble," together with a Navy tug, and other smaller surface craft also proceeded to the scene. An additional PBY aircraft was ordered out, as were two SA-16 amphibious aircraft of Flight "C", First Air Rescue Squadron, U. S. Air Force, from Ramey Air Force Base, Aguadilla, Puerto Rico. One Coast Guard aircraft and two Air Force aircraft landed and engaged in the rescue activities. Other aircraft, including the Air Force C-47 which had observed the ditching, circled the area to coordinate the rescue activities, drop flotation gear, and spot survivors. Seventeen survivors and a number of bodies were picked up by the crews of the rescue aircraft and the "Bramble." Rescue activities were greatly hampered by the heavy seas, the waves being 10 to 15 feet high. Aircraft in the air spotted a number of sharks in the vicinity of persons in the water, and shark repellent was dropped.

On April 10, the day prior to the accident, the aircraft involved was flown from New York International Airport to San Juan as Flight 527. Captain F. E. Adams, the pilot-in-command of this flight, stated that after departing the ramp at New York and during the engine run-up, No. 3 engine did not function properly. At this time it was noticed that the left magneto of this engine was completely dead. The aircraft was returned to the ramp for magneto service, after which the engine functioned in a normal manner. During the run-up, no unusual engine noises were heard, and the oil pressures, fuel pressures, and fuel flow, etc., were within operating limits. During the takeoff and climb the aircraft appeared to fly normally in every respect and with all engines running smoothly. After flying for approximately two hours and thirty-five minutes, No. 3 engine began running roughly. A short time later the engine backfired, and its propeller was feathered. Considerable difficulty was experienced in keeping the propeller in this position. Captain Adams further stated that the indicated fuel flow for the three operating engines was below what he expected and he noted this condition in the aircraft's Maintenance Log.

Pan American World Airways employs a chief mechanic, several assistant chief mechanics and an adequate crew of mechanics to perform all necessary maintenance at San Juan. In the event it is necessary to change an engine at this base, it is done upon advice from Miami.

Upon the arrival of Flight 527 at San Juan on April 10, the aircraft was taken to the maintenance hangar for repair, and the right magneto on No. 3 engine was replaced. The fuel flow gauges were checked, and a comparison between the No. 4 gauge and the No. 1 and No. 2 gauges showed that No. 4 was registering 20-25 pounds low. No entry of this discrepancy was entered on the log sheet. As a precautionary measure, the No. 3 engine oil sump and screen were checked. Small metal flakes were found on the screen, and a similar flake was found on the sump plug. These metal flakes were tested by using a magnetized screw driver and were believed to be aluminum. During the run-up of the engine, the mechanic heard a scraping noise which appeared to come from the nose section. The assistant chief mechanic immediately checked the log and noticed that difficulty had been experienced in feathering the propeller on the last flight. As he was going off duty at this time, due to a routine crew change, he passed this information on to the next assistant chief mechanic relieving him.

The new crew ran No. 3 engine for approximately two minutes and because of the unusual noise in the nose section stopped the engine. The nose section was removed, and additional metal flakes were found in the lower part of the nose section housing. Mechanics were assigned to remove and check the sump plug and oil screen. As a result of this inspection, metal flakes were again found in the sump. A mechanic then drained and cleaned the oil tank and hopper. Examination of the hopper revealed the presence of approximately a teaspoonful of metal flakes. These flakes were tested by use of a magnetized screw driver and sulphuric acid; and in the opinion of the mechanics who made these tests, the flakes were aluminum. (The use of sulphuric instead of nitric acid to determine the composition of the metal flakes was not in accordance with the procedure outlined in the company's Maintenance Manual. The manual describes the

reaction of certain metals to nitric acid, and the only similarity to these reactions when sulphuric acid is used is when the metal is aluminum.) The nose section itself was not disassembled; however, it was given a cursory examination and a mechanic stated that a bearing was damaged. Also, flakes of metal were found in the bottom of the nose section. A mechanic placed his fingers through the opening to check the scavenger pump drive gears and found metal flakes inside next to the gears. These findings were called to the attention of the assistant chief mechanic.

The chief mechanic was not on duty when this work was done; however, had the assistant chief mechanic considered the matter of sufficient import, the chief could have been contacted, since he was subject to call at all times. The assistant chief mechanic did not consider this course of action necessary and according to company policy sent the following message to the company's Miami office:

"OXMIA MJMIA OWSJU N88899 #3 ENGINE FEATHER STAGE 4 DUE ROUGH  
RIGHT MAGNETO STOP SAND FOUND ALUMINUM SHAVING ON SUMP STOP FLUSH  
ENGINE CHANGED OIL CHANGED RIGHT MAG STOP ON R/W FOUND BAD NOISE  
ON NOSE SECTION STOP PROCEEDING CHANGING NOSE SECTION STOP WILAD  
AFTER R/R MASJU 110540"

In effect, this message means that he was changing the right magneto, that he had found aluminum flakes in the sump and oil screen, and that he was flushing the engine and changing the oil; also, because of a noise the nose section was being changed. Miami did not acknowledge receipt of this message or issue any instructions. According to the testimony of the mechanic, since nothing was heard from Miami, he considered that he had approval to proceed as stated.

The company's Maintenance Manual specifically states that when foreign material, such as aluminum, is found in the sump, etc., the following course of procedure is to be followed: "The entire oil system, including oil tank, oil radiator, oil temperature regulator and oil pump, must be thoroughly cleaned and flushed, or replaced, including the accessory section screen. Put about 10 gallons of oil in the tank and run the engine for about one-half hour, bringing it up to take-off power once for five seconds only during this period. Drain oil, clean the strainer screen and fill oil tank to proper level. Run up engine again, pull screen and sump plug, also the small screen located between the oil pump and vacuum pump on the accessory section. If all right, release for flight."

When the nose section was changed, the above procedure was not followed, in that the specified engine run-up with only 10 gallons of oil in the tank was omitted. The purpose of this run-up with but 10 gallons of oil is to accomplish a more efficient flushing of the engine's oil passages, thereby depositing any additional metal flakes in the oil to be drained or on the oil sump plug and screen. By eliminating that part of the prescribed procedure this additional check was not made, and a necessary one-half hour of engine run-up time was lost. Instead, oil was placed in the tank to the full level, and the engine was then run up for a few minutes and appeared

to function properly. The oil sump plug and screen were then checked, and since no flakes of metal were found, the engine was released for service.

Subsequent to the accident, the nose section which had been removed was disassembled and examined by the Board's investigators, and certain parts were removed and forwarded to the Washington office for further examination and study. This examination revealed that the reduction drive gear bearing had partially failed. Failure of this bearing allowed the reduction drive gear teeth to move partially out of mesh. Continued operation in this condition would eventually result in complete failure of the reduction gear assembly.

The six sludge cups from the No. 3 engine propeller reduction gearing were forwarded to Washington, where the contents of these cups were given a spectrographic examination at the U. S. Bureau of Standards. This examination showed that metal particles were concentrated in the upper 1/32-inch layer of the sludge; and when these metal particles were separated, it was found that the major constituents were silver and iron. The minor constituents were copper, indium, chromium, manganese, nickel and lead. With the exception of the lead, which is an anti-detonating agent of the fuel that does not burn, all constituents were materials used in the manufacture of the engine. The remainder of the sludge below the 1/32-inch layer had lead as its major metallic constituent.

As the aircraft was departing the ramp, the log was placed aboard, which was the first time that information was available to the crew that the nose section of No. 3 engine had been replaced; however, none of the crew checked the log before take-off.

The Latin American Division of Pan American World Airways maintains a flight and ground training school at its Miami Base. All flight training is taught by professional instructors. These instructors devote their entire attention to pilot instruction and do not fly the line.

Captain Burn was employed by Pan American World Airways as a co-pilot September 9, 1942, and checked out as co-pilot on DC-4 aircraft June 27, 1946. In the fall of 1950 he was trained for 35 hours in the Dehmel trainer and received several hours' training in a Boeing 377 aircraft, following which he served as a co-pilot on this type aircraft for a period of approximately one year. In January of 1952, Captain Burn completed his ground school training and 18 hours of flight training on DC-4 equipment. This was given as transition training from co-pilot to captain.

On January 9, 1952, upon completion of his transition training, Captain Burn was recommended by his instructor for pre-command and type rating checks on DC-4 aircraft. As a result, on this date Captain Burn was given both an oral examination and a flight test by the Chief Flight Instructor, who, feeling he needed additional time, flew with him on the two following days, after which he was given the necessary ratings. Captain Burn had flown approximately 208 hours as pilot-in-command in DC-4 equipment prior to the accident.

A review of the aircraft's records indicated that prior to departing this flight, the engines had the following total time since last overhaul: Nos. 1, 2 and 4 engines, 1256:24, and No. 3 engine, 1122:11. In the Maintenance Log, under "flight entries," were several comments which indicated that the aircraft was sluggish in climbing. In each instance, the aircraft was below the allowable gross weight. Other comments reflected fuel flow below normal and considerable magneto trouble. The log, under "Maintenance and Service," indicated that the fuel flow items were "continued to Miami."

### Analysis

Only a minor trim correction for yaw was required from the time the propeller was feathered on No. 3 engine until the aircraft was ditched. This was true despite the fact that during certain portions of the flight, take-off and maximum power were used on Engines Nos. 1 and 2. During these power settings, No. 4 engine was set at 32-35 inches of mercury. From this it can be seen that the No. 4 engine was producing considerable power, otherwise, there would have been a decided yawing moment when power was increased on engines 1 and 2. It has been established by flight tests that the DC-4 aircraft loaded in a like manner will maintain level flight, and climb slowly, with only two engines operating at a maximum continuous power and with the propellers of the remaining two engines feathered. Therefore, the aircraft, under the conditions described, should have at least maintained altitude.

Referring to the Performance Chart in DC-4 CAA Approved Flight Manual, it is noted that with altitude and temperature, etc., corrected to the conditions surrounding this accident, and with two engines operating at maximum continuous power, propellers of the remaining two engines feathered, the aircraft will climb at the rate of approximately 25 feet per minute. Also, with three engines operating at maximum continuous power and the fourth engine's propeller feathered, the aircraft will climb at approximately 400 feet per minute.

Engines which have considerable time in service may suffer a loss in power. All of the engines involved had approximately 1200 hours of service since overhaul. As the engines were not equipped with torque-meters, it was impossible to determine accurately what their actual power output was on this flight. However, even assuming that there was a loss of power due to time in service, it is difficult to understand how the accumulated power of the three engines operating as stated could be less than that from two good engines operating at maximum continuous power.

Throughout the flight and the subsequent ditching, the captain stated he followed the prescribed procedures outlined in the company's Operation and Flight Manuals. He said that, after feathering the No. 3 propeller, he established an air speed of 145 miles per hour throughout the climb but after experiencing difficulty with No. 4 engine he then established an air speed of 135 miles per hour in an effort to climb



at the maximum rate. Although the company's Flight Manual states that these air speeds are correct for 3-engine and 2-engine operations, respectively, this applies to aircraft equipped with lower horsepower engines than those on this aircraft. The manual also states under "Engine Failure" and "During Climb After Takeoff," "should an engine fail after power has been reduced to climb power or at any time after takeoff, set power on good engines to 'rated power' or 'takeoff' if necessary. After power has been increased, the engine feathering procedure should be completed."

Captain Burn said that after he had established air speed of 135 miles per hour, the aircraft continued to lose altitude, and that the two good engines were not increased to take-off power until he decided to dump fuel. Since it was established that the fuel dumping operation was started approximately two minutes prior to the landing on the water, it can be seen that a considerable period of time was dissipated in attempting to climb at rated power. In an emergency such as this, where the maximum altitude involved was only 550 feet, it would seem that good flying technique would not permit a loss of air speed by maintaining a continuous nose high attitude. This could well have meant the difference between maintaining level flight and losing altitude.

The attendants were not advised in sufficient time that the aircraft was to be ditched for them to adequately prepare the passengers for a water landing. When the second officer first came to the cabin, he told the attendants to close all electrical circuits to prevent a possible fire as fuel was to be dumped. This was done, and according to the purser and the steward, they considered these instructions as routine and did not interpret them to mean a ditching was imminent. When the second officer next returned to the cabin, they could not hear him from where they were seated, but from his actions they knew the aircraft was to be ditched. They immediately put on their own jackets but made no attempt to warn the passengers. Additional lives might have been saved if previous instructions had been given the passengers in the location and use of the jackets.

The company's policy of stowing all life rafts in a single compartment to the rear of the pilots does not permit ready accessibility. In this location they are available only to the crew, and because of the close quarters in this section of the aircraft, they cannot be readily launched. In this instance, only one raft could be released from its moorings, as a second raft was jammed when attempts were made to release it. If more life rafts had been readily available, additional lives might have been saved.

The mechanics at San Juan who performed the service on the No. 3 engine and changed this engine's nose section said that all work done by them was performed as prescribed in the company's Maintenance Manual. The assistant chief mechanic, however, did not consider it necessary to change the engine, although a large quantity of metal flakes was found in the oil hopper, etc. This did not necessarily mean that these particles had traveled through the engine; however, it did indicate that some part

or parts of the engine had failed. To determine the extent of this failure, the engine should have been further disassembled. This was not done. Instead, a nose section was installed despite considerable evidence of metal particles in the old nose section and the lower front of the power section of the engine. A dispatch describing the action being taken was then sent to the company's Miami office. That office, having received this information, should have issued instructions to San Juan that this engine be changed. Due to the condition of the No. 3 engine, the aircraft was not airworthy when it departed San Juan.

The analysis of the contents of six sludge cups from this engine's propeller reduction gearing definitely showed particles of metals other than aluminum. The top 1/32-inch of sludge was predominantly silver and iron, whereas the major metallic constituent of the remainder of the sludge was lead. The rate of deposit of material can be expected to increase in the event of a progressive failure in the engine. Therefore, the silver and iron deposit in the top 1/32-inch of sludge indicated that a progressive failure was occurring. The above reasoning is in accord with the observed wear pattern on the propeller reduction pinions and drive gear.

The evidence indicates that the maintenance operations of this carrier at San Juan were not conducted in accordance with the high standards required for airline operation.

As a result of this and similar accidents the Board has proposed amendments to Parts 40, 41, 42 and 61 of the Civil Air Regulations with relation to emergency and evacuation equipment and procedures, to assure a greater degree of safety to the occupants of aircraft flying over water routes. It has been found that accidents have occurred when there was insufficient time to adequately plan and prepare for a ditching. Among others, the following amendments to the Board's regulations have been proposed:

1. All required rafts and life vests shall be approved, shall be adequately equipped for the route to be flown, and shall be installed in approved locations. They shall be readily available and easily accessible to the crew and passengers in the event of an unplanned ditching.

2. In the case of extended overwater operations each air carrier shall establish procedures for orally briefing passengers as to the location and method of operation of life vests and emergency exits and the location of life rafts. Such briefing shall include a demonstration of the method of donning a life jacket. Such briefing shall be accomplished prior to take-off on all extended overwater flights on which the aircraft proceeds directly over water. On flights not proceeding directly over water, the briefing shall be accomplished some time prior to reaching the overwater portion of the flight.

The Board is continuing studies of problems relating to aircraft ditching and evacuation.

### Findings

On the basis of all available evidence the Board finds that:

1. The carrier, the aircraft and the crew were properly certificated.
2. Weather was not a factor in this accident.
3. The company's maintenance department at San Juan should have been alerted to a dangerous condition when metal particles were found in the nose section of No. 3 engine.
4. Pan American's Miami office, having received information regarding the No. 3 engine from the maintenance department at San Juan, should have issued instructions to San Juan that this engine be changed.
5. Due to the condition of No. 3 engine, the aircraft was not airworthy when it departed San Juan.
6. No. 3 engine failed immediately after takeoff, which was followed by a partial loss of power from No. 4 engine.
7. The captain demonstrated questionable flying technique under the existing conditions.

### Probable Cause

The Board determines that the probable cause of this accident was (a) the company's inadequate maintenance in not changing the No. 3 engine which resulted in its failure immediately subsequent to takeoff, and (b) the persistent action of the captain in attempting to re-establish a climb, without using all available power, following the critical loss of power to another engine. This resulted in a nose-high attitude, progressive loss of air speed and the settling of the aircraft at too low an altitude to effect recovery.

BY THE CIVIL AERONAUTICS BOARD:

/s/ DONALD W. NYROP

/s/ OSWALD RYAN

/s/ JOSH LEE

/s/ JOSEPH P. ADAMS

/s/ CHAN GURNEY

## S U P P L E M E N T A L   D A T A

The Miami office of the Civil Aeronautics Board was notified of this accident by Pan American World Airways in Miami at approximately 1135 EST April 11, 1952. An investigation was immediately initiated in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. A public hearing was ordered by the Board, and was held in the Public Amusement and Park Administration Building, Ponce De Leon Avenue, Parada 8, San Juan, Puerto Rico, on May 5, 1952.

### Air Carrier

Pan American World Airways, Inc., is a New York corporation, having its main offices at 135 East 42nd Street, New York City, and operates as an air carrier under a certificate of public convenience and necessity and an air carrier operating certificate issued pursuant to the Civil Aeronautics Act of 1938, as amended. These certificates authorize the carrier to engage in air transportation with respect to persons and property between various points in the United States and foreign countries, including San Juan, Puerto Rico.

### Flight Personnel

Captain John C. Burn, age 33, was employed by Pan American World Airways September 9, 1942. He was the holder of a valid airman certificate with an air transport rating. Captain Burn had a total of 6,920 flying hours, of which 4,995 were in DC-4 equipment. He was qualified to fly as captain in DC-4 aircraft January 11, 1952. He had a total of 208 hours as pilot-in-command of DC-4 aircraft prior to the accident. His last instrument and equipment check was accomplished January 11, 1952 and his last route check was on January 18, 1952. Captain Burn received his last CAA physical examination on February 27, 1952.

First Officer W. T. Hutchins, age 30, was employed by Pan American World Airways on February 15, 1951. He held a valid airman certificate with commercial pilot, single and multi-engine land, flight instructor and instrument ratings. He had a total of approximately 5,000 flying hours, of which 708 were in DC-4 equipment. His last instrument and equipment check was accomplished March 26, 1952 and his last CAA physical examination November 19, 1951.

Second Officer J. R. Laubach, age 34, was employed by Pan American World Airways, October 29, 1951. He held a valid airman certificate with commercial pilot instrument and flight instructor ratings. He had a total of approximately 2,000 flying hours, of which 54 were in DC-4 equipment. His last instrument and equipment check was accomplished February 13, 1952, and his last CAA physical examination April 23, 1951.

Purser A. Perez was employed by Pan American World Airways on April 4, 1946. Steward R. Torres was employed by Pan American World Airways on July 2, 1951.

## The Aircraft

N88899, a Douglas DC-4, was owned and operated by Pan American World Airways and was currently certificated by Civil Aeronautics Administration. It had a total of 20,835 flying hours, of which 1,514 were accumulated since overhaul, and was equipped with Pratt & Whitney R-2000 engines and Hamilton Standard 23E-50 propellers.